

## **WHAT IS CLAIMED IS:**

- 1                    1.        A nanofiber comprising a first polymer and a biological material,  
2        wherein said nanofiber has a plurality of nanopores.
- 1                    2.        The nanofiber of claim 1, wherein said first polymer is a synthetic  
2        polymer.
- 1                    3.        The nanofiber of claim 1, wherein said first polymer is a naturally  
2        occurring polymer.
- 1                    4.        The nanofiber of claim 2, wherein said synthetic polymer is a member  
2        selected from the group consisting of: poly(ethylene oxide), poly(vinyl alcohol),  
3        poly(ethylene naphthalate), polyaniline, polyacrylic acid, polyacrylon nitrile, polystyrene,  
4        polymethylmethacrylate, poly(N-isopropylacrylamide), polyvinyl acetate, and derivatives  
5        thereof.
- 1                    5.        The nanofiber of claim 3, wherein said naturally occurring polymer is a  
2        member selected from the group consisting of: polysaccharides, polypeptides, cellulose,  
3        poly-L-lactide, cellulose, casein, and derivatives thereof.
- 1                    6.        The nanofiber of claim 1, wherein said biological material and said  
2        first polymer are present in a ratio of about 1:20 to about 20:1.
- 1                    7.        The nanofiber of claim 1, wherein said biological material and said  
2        first polymer are present in a ratio of about 1:10 to about 10:1.
- 1                    8.        The nanofiber of claim 1, wherein said biological material and said  
2        first polymer are present in a ratio of about 1:5 to about 5:1.
- 1                    9.        The nanofiber of claim 1, wherein said biological material and said  
2        first polymer are present in a ratio of 1:4.
- 1                    10.       The nanofiber of claim 1, wherein said biological material is  
2        covalently attached to said nanofiber via a linker.
- 1                    11.       The nanofiber of claim 10, wherein said linker is a member selected  
2        from the group consisting of: polyethylene glycol (PEG), polyacrylic acid (PAA),

3 polyacrylamide (PAM) as non-ionic, and dimethylaminoethyl methacrylate (DMAEMA) or  
4 combinations thereof.

1 12. The nanofiber of claim 1, wherein said nanofiber is about 50 nm to  
2 about 1000 nm in diameter.

1 13. The nanofiber of claim 1, wherein said nanopores are about 5 nm to  
2 about 500 nm in diameter.

1 14. The nanofiber of claim 1, wherein said nanopores are about 25 nm to  
2 about 100 nm in diameter.

1 15. The nanofiber of claim 1, wherein said nanopores are about 5 nm to  
2 about 25 nm in diameter.

1 16. The nanofiber of claim 1, wherein said nanopores are about 10 nm to  
2 about 50 nm in diameter.

1 17. The nanofiber of claim 1, wherein said nanofiber is insoluble in an  
2 aqueous solution.

1 18. The nanofiber of claim 1, wherein said nanofiber is insoluble in an  
2 organic solution.

1 19. The nanofiber of claim 18, wherein said first polymer is crosslinked.

1 20. The nanofiber of claim 1, further comprising a second polymer.

1 21. The nanofiber of claim 20, wherein said first polymer and said second  
2 polymer are present in a ratio of about 1:20 to about 20:1.

1 22. The nanofiber of claim 20, wherein said first polymer and said second  
2 polymer are present in a ratio of about 1:10 to about 10:1.

1 23. The nanofiber of claim 20, wherein said first polymer and said second  
2 polymer are present in a ratio of 4:1.

1 24. The nanofiber of claim 20, wherein said first polymer and said second  
2 polymer are present in a ratio of 1:4.

1                   25.     The nanofiber of claim 20, wherein said first polymer and said second  
2 polymer are present in a ratio of 1:1.

1                   26.     The nanofiber of claim 20, wherein said first polymer is a synthetic  
2 organic polymer and said second polymer is a naturally occurring polymer.

1                   27.     The nanofiber of claim 1, wherein said biological material is a protein.

1                   28.     The nanofiber of claim 27, wherein said protein is a member selected  
2 from the group consisting of: integral membrane proteins, structural proteins, intracellular  
3 proteins, and enzymes.

1                   29.     The nanofiber of claim 26, wherein said synthetic organic polymer is a  
2 member selected from the group consisting of: poly(ethylene oxide), poly(vinyl alcohol),  
3 poly(ethylene naphthalate), polyaniline, polyacrylic acid, polyacrylon nitrile,  
4 polysaccharides, cellulose, poly-L-lactide, polystyrene, polymethylmethacrylate, poly(N-  
5 isopropylacrylamide), polyvinyl acetate and derivatives thereof, and said naturally occurring  
6 polymer is a member selected from the group consisting of: polysaccharides, polypeptides,  
7 cellulose, poly-L-lactide, cellulose, casein, and derivatives thereof.

1                   30.     The nanofiber of claim 28, wherein said protein is an enzyme.

1                   31.     The nanofiber of claim 30, wherein said enzyme is a member selected  
2 from the group consisting of: a lipase, a carbohydrase, a DNase, and a protease.

1                   32.     A membrane comprising a nanofiber comprising a first polymer and a  
2 biological material, wherein said nanofiber has a plurality of nanopores.

1                   33.     The membrane of claim 32, wherein said membrane is insoluble in an  
2 aqueous solution.

1                   34.     The membrane of claim 32, wherein said membrane is insoluble in an  
2 organic solution.

1                   35.     The membrane of claim 32, wherein said biological material is  
2 attached to said membrane via a linker.

1                   36.     The membrane of claim 35, wherein said linker is PEG.

- 1                    37.     The membrane of claim 35, wherein said linker is PAA.
- 1                    38.     A fabric comprising a nanofiber comprising a first polymer and a  
2 biological material, wherein said nanofiber has a plurality of nanopores.
- 1                    39.     The fabric of claim 38, wherein said biological material is attached to  
2 said nanofiber via a linker.
- 1                    40.     The fabric of claim 38, wherein said linker is PEG.
- 1                    41.     The fabric of claim 38, wherein said linker is PAA.
- 1                    42.     An insoluble nanofiber comprising a polymer and a biological  
2 material, wherein said nanofiber is insoluble in an aqueous solution.
- 1                    43..     An insoluble nanofiber comprising a polymer and a biological  
2 material, wherein said nanofiber is insoluble in an organic solution.
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